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Activation process analysis of the Localized Agri-food System using social networks

Jazmin ENRIQUEZ-SANCHEZ, Manrrubio MUNOZ-RODRIGUEZ,
J. Reyes ALTAMIRANO-CARDENAS*, Abraham VILLEGAS-DE GANTE

Universidad Autónoma Chapingo/Posgrado en Ciencia y Tecnología Agroalimentaria, Chapingo, Mexico

*Corresponding author: jreyesa@ciestaam.edu.mx

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Abstract: The objective of the work was to analyse the prevailing activation process of the Localized Agri-food System (LAS) by using social networks as a tool to value the pre-existing social capital. There were 27 producers of "Chiapas Cream Cheese" and the members of the formal cheese maker organization from the state of Chiapas, Mexico that were interviewed. By the means of cluster analysis and the graphic design of friendship, the kinship, the "compadrazgo" knowledge, the collaboration and cooperation networks, we concluded that the structural activation must transcend the formal creation of an organization. It is best to value and then mobilize the pre-existing social capital in a territory with a specific traditional know-how as a foundation to the structure and activation process of the LAS. Four actors were identified for their active participation in all analysed networks; these were the information diffusers and network structures. Weak links in the cheese maker organization favour the innovation adoption; whereas the strong links maintain the know-how.

Keywords: collective action, social capital, genuine cheese, "know-how"

Contrary to the preconceptions that globalisation would lead to a standardisation of supply everywhere (Levitt 2006), at present there is the evidence about the importance of the local adaptation of assets and services as a condition for positioning in consumer markets (Rigby and Vishwanath 2006). Thus, the global marketing specialists demonstrate that a strong and consistent identification of a product with a country or region is translated into opportunities for the emerging trademarks. So it is necessary to create a real-emotional differentiation that promotes specific and local-related attributes (Deshpande 2007; Quelch 2007).

At a worldwide level, there is a bigger demand for food products with specific quality labels, which detail the product's origin, tradition and specific *know-how***.** The promotion and assurance of quality related to its origin simultaneously contribute to the rural territory development and the possibility of consumers choosing the product. Products related to origin show quality attributes associated with the geographical place where they have been produced, and with time, they acquire reputation thanks to the geographical indication that identifies them (Vandecandelaere et al. 2010).

The construction processes of a geographical indication, the denomination of origin or the collective trademark for the agri-food and handicraft assets have acquired a special importance at the international level. Cheeses are genuine handicraft foods that enjoy this legal protection, especially those of the European origin. There are over a thousand varieties of cheese all over the world; and besides being nutritious, cheeses are appreciated for their culinary characteristics (Romero-Del-Castillo-Shelly and Mestres-Lagarriga 2004).

In Mexico, there are at least 35 different types of genuine cheeses, primarily elaborated by the micro and small handicraft agro-industries scattered all over the national territory, with a strong concentration on particular areas where the specific resources, assets, and the local know-how are found (Villegas-de Gante 2003). Products "of origin" or that are "cultural" are also found, which gives rise to the conformation of a Localized Agri-food System (LAS) (Boucher and Reyes-González 2011). One of those genuine cheeses is

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the Chiapas Cream Cheese, which belongs to the group of soft paste, fresh and pressed cheeses. It is elaborated from the raw, whole or partially skimmed cow milk from double purpose cattle (Cervantes-Escoto et al. 2008). The geographical conditions, weather, vegetation, soil and cattle, as well as the know-how about its preparation, have made the Cream Cheese a unique product (Jiménez-Rincón et al. 2011).

However, all of the previous characteristics that define the Chiapas Cheese Cream have not been sufficiently valued and the knowledge of the cheese has not spread far out of the regions of production, and most of the consumers from outside this area do not recognise a true Cheese Cream. It becomes relevant because in the local, regional and national markets, there are cheeses available that appear to be the traditional Chiapas Cream Cheese, but these cheeses are not made in Chiapas and the markets produce false copies of the famous Cream Cheese labels and these imposter labels are commonly not registered with any government institution.

The collective trademark for the Chiapas Cream Cheese came up as a governmental initiative that consolidated the informal cheese maker relationships (social) in a formal network, namely the Processors Society. Specifically, it was a top down initiative to preserve a traditional product, while also protecting the people's health by knowing what factories the cheeses came from, as well as guaranteeing the quality for the consumers.

Cheese makers have advantages by being a group with a strong social capital, such as the support received from institutions that subsidise innovation projects as the main objective. These institutions include universities that develop the academic, historic and social research in order to contribute to the collective trademark. This support was only possible when the group was legally constituted, initially with 40 members.

On the other hand, large-scale processors tend to abandon the production of this specific kind of cheese, which could lead to the disappearance of the Chiapas Cream Cheese if no actions are taken for its activation and market positioning. Although the actual market is increasingly globalised, members also recognise that local products may be differentiated and positioned in this global market.

With this background, a collective action process has been initiated by the State of Chiapas' government and a group of cheese makers, with the purpose of creating a Collective Trademark, and eventually the Denomination of Origin for this cheese in order to protect, preserve and disseminate its *know-how*. This can help to maintain the source of income for processors and suppliers.

Considering that a collective action is necessary to accomplish a functional protection, a primary aim of this research is to assess the existing social capital in the Chiapas cheese processors' network through the analysis of social networks. The purpose is to evaluate the viability in order to undertake an activation process of the Localized Agri-food System (LAS) via a figure of legal protection. A second objective is to characterise the handicraft cheese processors using the socio-economic variables in order to identify the factors of individual choice that encourage the collective action towards a common goal.

BACKGROUND

The importance of a collective trademark

There are several positive aspects in the economic field because of the registration of a trademark. First, the intellectual property is appreciated as an intangible asset; second, retailers with a trademark have more possibilities to sell their products or services because of the customer's recognition (Trejo-Sánchez and Sanabria-Valdés 2011).

Moreover, a geographic or local label is important for the Cream Cheese and for the traditional products because it shows proximity as an indicator of freshness. It denotes products that are considered part of the local economy, makes connections between customers and local producers and defines the locality in terms of the area from which the store draws customers (Guptill and Wilkins 2002).

In order to create a Collective Trademark or a Denomination of Origin, three elements are required: the declaration of protection, technical norms that establish the protected product specifications and the evaluation scheme of conformity with the norm specifications, which requires one to insure the traceability towards the product (Dirección General de Normas 2010). The collective action of a group of actors is necessary, particularly of cheese makers, who, with their traditional *know-how*, their personal relationships, and their established techniques, must agree on the standards that will identify the cream cheese in the market.

Developing a geographic local label is more than just meeting the bare requirements. It means knowing

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the social relationships among the producers, which promotes the cooperation access to the market, improves the quality of the product, shares experiences and avoids disintegration or exclusion, as occurred with the "Olinala" and "Talavera" products that already have a Denomination of Origin (FONART 2010).

Social networks and their study

A social network is social capital when the involved actors in the interchange relations provide different types of resources that can be accessed by the others members. These resources can be part of the members' capital, but there are resources that are integrated into the networks from the external agents with whom the actors interact and that have a direct or indirect access. Networks have the ability to extend the range of available resources to each of its constituent agents, so the actor's experience is available to others in order to achieve the common goals and objectives (Viteri-Diaz 2007).

Indeed, social networks are informal links that tighten up the relationships among family, friends, neighbours or co-workers (Putnam 2000). It is a common assumption that the participation in a collaborative network has the potential to bring benefits to the involved entities. In addition, the new organisational forms induce the innovation and creation of new values by confronting ideas and practices, using a combination of resources and technologies, and creating synergies (Camarinha-Matos and Afsarmanesh 2006). Therefore, the resource for the collective action, which may lead to a broad range of outcomes, is understood as being social capital (Stone 2003).

Social capital is understood as being networks of social relations characterised by the norms of trust and reciprocity. The essence of social capital is the quality of the social relations. It distinguishes between bonding social capital (involving trust and reciprocity in closed networks), bridging social capital (ties to people who do not share many characteristics) and linking social capital (involving social relations with authorities, which might be used to get resources or power) (Woolcock and Narayan 2001; Atria 2003; Stone 2003).

Rovere (1999) formulated the criteria to value the "strength and quality" of links in a social network into five levels. The first level is the *recognition* (acceptance of the other), which establishes that networks cannot be created with others whose right to exist and express their opinion is not recognised. The second level is the *knowledge* (interest in knowing what the other does and how he/she does it) and the interest in knowing who the other is that exists and understanding how the world looks from there.

The third level emerges from an interest and knowledge of the other: a spontaneous collaboration appears at these triggering *collaboration* elements (co-work or "work with"). Moments, facts and circumstances of collaboration mechanisms that structure a series of reciprocal links are registered. At the fourth level, the systematic forms of *cooperation* are registered (co-operates, "joined operation"); this implies a more complex process because it assumes the existence of a common problem, which means that there is a "co-problem" and a more systematic and stable form of joined operation exists. Finally, there is a fifth level, where an association is given that involves linkages formalised in contracts and agreements. At the end, the competencies are a link or a translation between the social psychology and social structure or social vision (Stevenson 1998).

Correa-Gómez et al. (2006) affirm that the processes of collective action are generated, in addition to the territorial concentration of agro industries. So, the *activation* of a LAS implies the development of competitive advantages associated with the activation of their specific resources (products, *know-how*, actor networks, and institutions, among others), as well as their capacity to combine these with resources external to the territory. According to Boucher (2009), the activation needs at least two phases: "structural collective action," which represents the creation of a group (association, cooperative or another form of organisation), and "functional collective action," which stands for the construction of a territorialised resource regarding quality: collective trademark, stamps and appellations of origin.

However, due to the fact that the LAS are dynamic systems and not static ones, the level of activation of each case is different. The degree of activation of the LAS can be evaluated by the level of relationship among the actors, the efforts in creating an image of the product, the formal participation as groups or associations and the development of collective actions, such as the consolidated buying and selling, the creation of a collective trademark and the rules of usage, among other (Correa-Gómez et al. 2006).

It is known that there is a growing first stage that corresponds to the conformation of concentration, a second one of stabilisation in which individual strategies are developed, a third one of growth and devel-

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opment in which collective actions are implemented and a final one of concentration and stabilisation (Correa-Gómez et al. 2006). Under these criteria, the arisen question is "What is the activation stage prevailing in the Chiapas Cream Cheese LAS?"

Spielman (2011) incorporates the analysis of social networks into the theory of innovation systems; the way that the small farmers innovate and how they embody new knowledge into the decision system because of the innovation is a consequence of the use and interchange of information. The character of the interactions among actors is basic, in a wide vision of the term innovation.

Social networks generate the knowledge externalisation. The knowledge and practices of an actor influence the practices or behaviours of other individuals. This knowledge externality affects the individual decision about the adoption of innovation practices or a new technology (Spielman et al. 2011).

The network analysis allows one to understand and detect the information flow into the group. Social networks work as an asset for individuals and homes in rural areas. They influence the information access, which benefits the research and development. For example, in a rice farming community in Vietnam, kinship networks serve as one of the main channels of the informal communication in the community, and they are an important source of information for large numbers of local people (Hoang et al. 2006). Besides, the informal opinion leaders in the community were identified as those people not only with a frequent contact with the local government and extension workers, but also with a higher education and a greater access to newspapers and leaflets (Hoang et al. 2006).

The conformation of dense social networks stimulates the cooperation in promoting the development of solid reciprocity rules. Social networks facilitate the communication and improve the information flow about the reliability of the individuals (Atria 2003; Forni et al. 2004).

AREA DESCRIPTION AND METHODS

Study area

The investigation was carried out in three regions of the State of Chiapas, the North region (municipalities of Reforma, Juárez, Rayon and Solosuchiapa); the Centre-frailesca region (municipalities of Ocozocuautla, Villaflores, Villacorzo and La Concordia) and the coastal area (municipalities of Pijijiapan and Mapastepec) (Figure 1). These places are known for their importance in the production of the Chiapas cheese cream. The basic principles regarding the elaboration of the Chiapas cheese cream could come from Europe, due to the constant migration of Spanish people since 1523, and the Germans during the mid-16th century to the Chiapas territory. Geographic conditions, climate, vegetation, soil, livestock and the *know-how* developed for the elaboration of the Chiapas Cheese Cream contributed to the creation of a unique product.

Sample size and network analysis

The sample size was determined by targeted sampling; 27 of the 54 members of the "Processors Society of Chiapas Cheese S.P.R. of R.L." were interviewed between August 2010 and March 2011.

The methodology proposed by Revere (1999) and Rendón-Medel et al. (2007) was used for the field work execution and then for the data analysis. The methodology stated by Correa-Gómez et al (2006) complemented Rovere's (1999) by using social networks to determine the state of activation of the Chiapas Cream Cheese LAS.

Surveys were designed for the cheese makers (ChM) where they had the opportunity to refer: a) actors with whom they share the knowledge related to the process of cheese elaboration, b) actors with whom they maintain friendship, c) actors with whom they

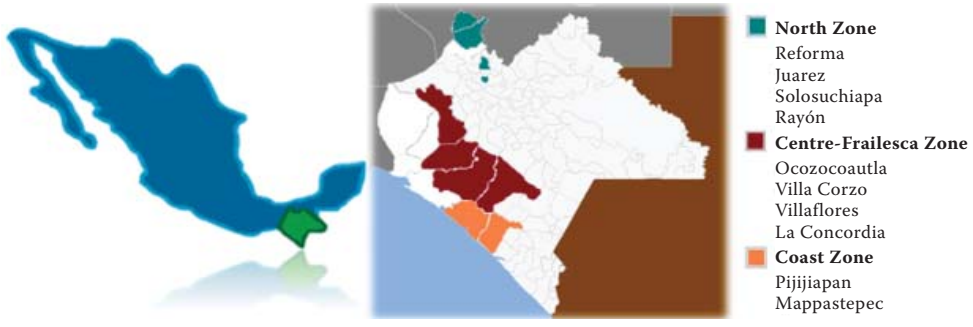

Figure 1. Study area

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Table 1. Criteria to analyse the pattern of cheese maker interaction

Patterns of social interaction
Level 1. Acknowledgement
1. Friendships between cheesemakers
2. Kinship between cheese makers
3. "Compadrazgo" relationship between cheese makers
Technical-economic patterns
Level 2 – Knowledge
4. With whom do you regularly share production/ commercialization experiences?
Level 3 – Collaboration
5. To whom do you recur when in trouble in your production activity?
Level 4 – Cooperation
6. With whom do you perform buy-sale actions in a solid manner?
Level 5 – Association
7. With whom do you share an association project? (economic resources jointly invested)
Cheese maker organization
8. What is your opinion on the performance of the organization?

are related, and d) actors with whom there is a "compadrazgo" relationship. These criteria were used to value the patterns of social interaction.

To understand the technical-economic interaction patterns between cheese makers, a series of questions were asked that allowed the researchers to evaluate the level of interaction according to the criteria presented in Table 1.

A statistical multivariate analysis by clusters was conducted with the SAS 9.1 in order to identify the groups in which the cheese makers were located according to their characteristics: (a) quantity of the processed milk (litres/day), (b) quantity of the self-produced milk (litres/day), (c) percentage of the total milk processed to be turned into cream cheese, (d) years as a cheese maker, (e) antiquity of the cheese factory (years), (f) age, (g) years of the formal education (since the elementary school), (h) jobs generated, (i) the person that taught them how to make Cream Cheese, and, (j) market (local and regional, state and national). The network structure was plotted using the Ucinet Version 6.84.

The social network theory has proposed some indicators and concepts to understand the patterns of social interaction. One of them is the network density (Equation 1), which estimates the possibility of accessing information among the network actors and evaluates the impact of promoting interaction through increasing relationships (Equation (1)).

$$D = \frac{2l}{n \times (n-1)} \times 100 \quad (1)$$

where:
(D) = density equals the number of existing relationships
(l) = between the numbers of possible relations ($n \cdot (n-1)$)

A 100% density indicates that all the actors are linked to one another; meanwhile, a density of 0% indicates that all actors are loose.

Individually, one actor can perform up to two different positions or roles within the network: those of structuring and/or those of diffusion. A structuring actor is primarily an intermediary between the network actors; the existence of this structuring actor visually explains the form, appearance and articulation of the network. The elimination of this actor causes the rupture into the network, so its function is organisation or articulation.

On the other hand, a diffusion actor is placed nearby to access the rest of the network. Its existence is valued for its potential to transmit information. It is identified for its position to access the largest numbers of actors (Rendón-Medel et al. 2007).

RESULTS

Cheese markers' profile

Twenty-seven Chiapas Cream Cheese producers were interviewed. There were some differences noted between the handicraft cheese factories, mainly regarding the production volumes and the proportion of milk dedicated to the production of the Cream Cheese in relation to the total processing. Such differences are explained in the formation of four groups with well-defined characteristics (Table 2).

Group 1. In this group, we found that the smallest cheese factories, although they have a lower volume of processed milk and a reduced number of workers, had the largest volume destined for the Cream Cheese production (67%). Meanwhile, the product moves mainly in the local market.

The group consists of 17 cheese makers, which represents 63% of the analysed actors. Members of the group are characterised as having an average age of 54 years and six to nine years of formal education. They process about 840 litres of milk per day in cheese factories that are, in average, 21 years

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Table 2. Characterisation of the Chiapas Cream Cheese producers

Variables	Groups			
	1	2	3	4
Quantity of processed milk (L/day)	840 ± 496	4 800 ± 380	12 000 ± 583	29 500 ± 423
Quantity of milk for self-sufficiency (L/day)	194 ± 653	126 ± 360	100 ± 300	0
Proportion destined to Cream Cheese (%)	67 ± 12	18 ± 3	17 ± 3	11 ± 12
Years as cheese maker	32 ± 8	22 ± 6	19 ± 2	20
Age of the cheese factory (years)	21 ± 10	19 ± 4	13 ± 2	18 ± 2
Age	54 ± 2	49 ± 3	44 ± 2	49 ± 2
Schooling[a]	2	2	3	2
Jobs created	3	10	24	38
From who did you learn the know-how[b]	2	2	3	2
Market[c]	1	2	2	2

[a]Schooling: 1 – elementary school; 2 – secondary school; 3 – high school

[b]From whom did you learn: 1 – training; 2 – family tradition; 3 – learned from another job

[c]Market: 1 – local and regional; 2 – state; 3 – national

old, they generate three jobs. These cheese makers have been producing the Cream Cheese for 32 years. Some producers are also owners of ranches, which allows them to self-supply up to 23% of their milk needs. This group learned the *know-how* as a family tradition.

Group 2. Five cheese makers (18.52% of the total) make up the second group. The average age of the group is 49 years old, and they have between six and nine years of formal education. They process 4800 litres of milk per day, and generate approximately 10 jobs per factory. The proportion of self-supplied milk is 2.6% of the total processing needs, but from the total volume processed, only 18% is destined for the Cream Cheese production. The market for the cheese produced by these factories is at the state level. The factories' average age is 19 years. The cheese makers in this group, in average, have spent about 22 years in this trade, which they learned by observation and as a family tradition.

Group 3. Only three cheese makers form the third group, with an average age of 44 years. These cheese makers have an average high school level of education with 12 years of formal education. The factories in this group process about 12 000 litres of milk daily, but only 0.8% comes from the self-production and the portion destined for making the Cream Cheese is 17% of the total processed. They learned how to produce the Cream Cheese through the cheese makers of other cheese factories. The cheese factories are, in average, 13 years old. They generate an average of 24 jobs per 1 cheese maker and destine their product to the state and national market.

Group 4. Group four has two members, which represents 3.5% of the total interviews. The members' average age is 49 years and they have an average of nine years of formal education. The processing volume for the factories in this group is 29,500 litres of milk per day, but they use just 11.5% of the total processed milk for the production of the Cream Cheese. They buy 100% of the milk and generate 38 jobs per factory. The producers learned how to make the cheese as a tradition from 20 years ago, and the cheese factories have an average age of 18 years. They sell their product at the state level.

This characterisation gives the evidence of a marked asymmetry between the processors. It also demonstrates a social distance, which can reduce trust and cooperation. Putnam (2000) identifies two types of networks: horizontal and vertical. The first one gathers people with the equal status and power, while the second ones link unequal agents in the hierarchical and dependent-asymmetric relations. The social capital is generated where the horizontal relations are established. In the studies conducted with the objective of observing the effects of social heterogeneity as a result of the decisions made by individuals, it was found that the social distance reduces trust and cooperation (Banco Interamericano de Desarrollo 2007). The bigger the social distance in a group (measured according to income or education differences), the smaller the cooperation among members (Banco Interamericano de Desarrollo 2007).

So the differences in the processed volume and proportion of milk destined for the production of the Cream Cheese become the vertical networks, which

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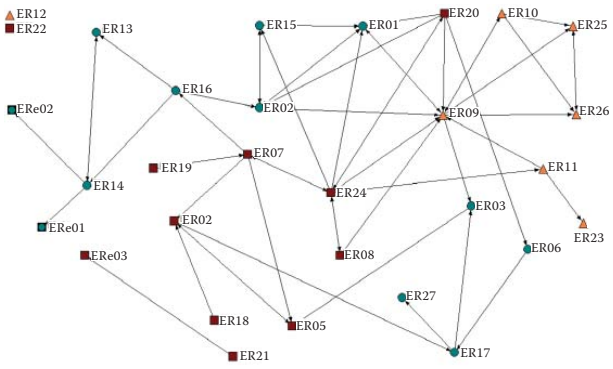
can influence the calculation of costs and benefits of a possible collective trademark.

Even though the cheese makers perceive that the work done by the association has been good and that there has been advancements made, producers from Group 1 think that they are not treated equally through the decision-making process, nor in the resource distribution that, up to now, has been negotiated with the government agencies. They attribute this to their low processed volumes.

Social interaction patterns

Two different interaction patterns were analysed. The first one corresponds to the social interaction patterns where the society was analysed in the terms of the social links among the members (friendship, kinship and "compadrazgo" networks). The results of these networks are shown in this section. The second interaction pattern refer to the LAS technical-economic topics, proposed by Rovere (1999) and comprised of the analysis of knowledge, collaboration, cooperation and association networks. Following section shows the results of the technical-economic patterns.

The relationships among cheese makers were informal before they were formally grouped, which, in turn, resulted in the existence of social capital between them. Social capital, summarised as the attributes such as trust, reciprocity, cooperation and shared values, becomes the linkage that unifies a relationship network (social, economic, financial, familiar or cultural) upon which the activation of a territory is sustained (Fukuyama 2003; Piña and Henri 2010).



○ North region □ Centre-frailesca Region △ Coast region

Figure 2. Chiapas Cream Cheese Processors Society friendship network. Size = 30 node; Density = 6.55%

The social capital refers to social organisation aspects, such as the networks, standards and trust, which facilitate the coordination and cooperation in a mutually beneficial manner (Farrell and Knight 2003; Vargas-Forero 2002).

According to the intensity of the relationships of solidarity, three types of social capital exist: bonding, linking and rapprochement or brinding (Woolcock and Narayan 2001; Atria 2003; Forni et al. 2004). In the scale proposed by Rovere (1999), acknowledgement (first level) implies the acceptance of the other via the relationships of friendship, kinship and "compadrazgo" relationships among cheese makers.

Friendship network

This network allowed us to identify the cheese makers that have a friendship among each other. Figure 2 suggests the existence of a well-structured friendship network. With the exception of two actors, all of the nodes are connected by at least one linkage, which is reflected in the density of 6.55%.

Figure 2 shows the formation of four sub-networks that are associated with the territorial localisation of the cheese makers. In this sense, the links of friendship are strengthened by the geographical proximity of the actors. Actor ER09 has the biggest connection with his pairs. With the exception of cheese makers from the North region, this actor interacts with the rest. These relations and interactions indicate a certain influence of ER09 on the rest of the group.

Nevertheless, even though ER24 has fewer links than ER09 (seven links compared with ER09's 10), ER24 plays the role of a bridge. The actor connects two sub-networks and maintains a friendship with the cheese makers from all of the areas. This actor has a more structured role than does ER09 (ER09 acts as the president of the formally constituted Cheese Maker Society). The producers from the different areas recognise ER24 as a prestigious actor that may be a future candidate for directing the group because of his linkage with the actors of all three areas. Both actors understand the process of the collective trademark to be an opportunity to extend their markets, despite the asymmetries that characterise them; while ER09 belongs to Group 3, ER24 belongs to Group 1.

Kinship networks

The results from the kinship analysis suggest that the cheese maker's "*know-how*" has been diffused from

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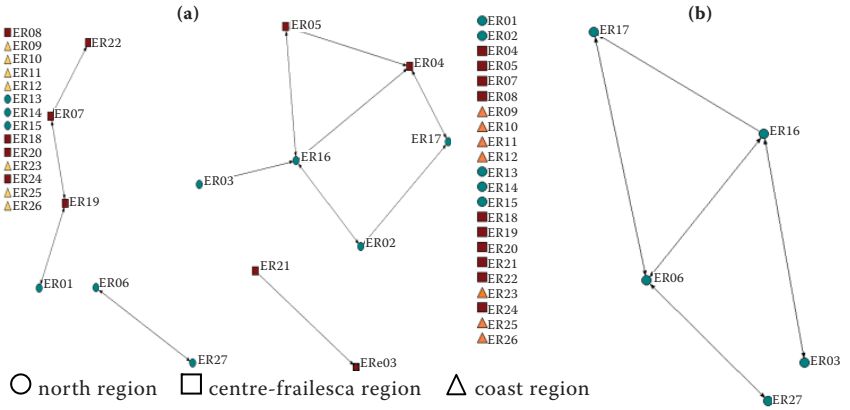

Figure 3. **(a)** Chiapas Cream Cheese Processors Society kinship network. Size=28 nodes. Density= 3.04%.
(b) Chiapas Cream Cheese Processors Society "compadrazgo" network Size = 27 nodes; Density= 1.28%

generation to generation, at least for 44% of the cheese makers. All of them were located in the Northern and central regions. On the other hand, the cheese makers from the coast have no kinship among them. Four family groups were identified, but two of them stand out for their linkage density (Figure 3a). The interaction pattern analysis of friendship (Figure 2) and kinship (Figure 3a) networks shows the following observations:

The network's density is 3.04%, but the actors with the highest linkage density in the friendship network (ER09 and ER24) do not belong to any of the four family groups identified in the kinship network. This is explained because the family groups tend to be closed groups. Due to the fact that ER09 and ER24 are not in a close family group, they interact easily with a bigger number of pairs. Actor ER02 in the friendship network is the actor with the third highest density. He could be a bridge between the two friendship sub-networks, while at the same time being a part of the widest kinship network. This seems to put him in a prestigious dialogue position.

"Compadrazgo" relationship

The "compadrazgo" relationship is structured by formalising friendship relations by acting as a godparent for the children or participating in religious ceremonies. In this network, five actors share this bond and represent 18% of the cheese makers interviewed; there is a network density of 1.28% (Figure 3b).

There were four kinship sub-networks identified, but two of them are unified via the "compadrazgo" linkage (ER06-ER16), and all of them are located in the same region, which suggests the strength of these relationships: to be a "compadre", first you have to be a friend, and that is achieved by the geographical closeness. The "compadrazgo" relationship begins with the frequent interaction and it is sealed by acquiring the formal status of "compadre". This relationship carries out more active roles within a group and establishes a frequent interaction among the actors (Abello-Llanos and Madariaga-Orozco 1999).

The closeness of social networks is a function of two factors. The first is the physical proximity that encourages a frequent contact. The second one is related to the degree of interdependence and obligations of individuals within the community. This last leads to the establishment of rules and sanctions in order to ensure the compliance, or at least to punish misconduct, stimulating the continuity of relationships based on trust and reciprocity (Forni et al. 2004).

Technical-economic interaction patterns

Once the analysis of the social interaction patterns has been performed from the recognition level among cheese makers, it is possible to continue with the next levels proposed by Rovere (1999), which refer to the LAS technical-economic topics. This analysis will allow one to value the degree of activation of the

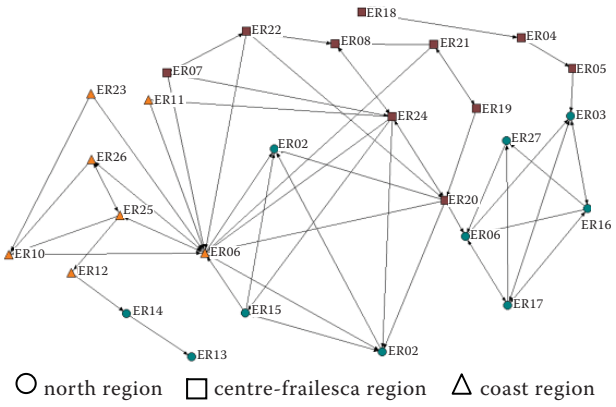

Figure 4. Knowledge social network. Size = 31 nodes; Density = 7.31%

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LAS based on the proposal formulated by Correa-Gómez et al. (2006).

Knowledge network

Although for half of the cheese makers the *know-how* for producing the Cream Cheese has been transmitted from generation to generation, there prevails a dense knowledge sharing within the group of cheese makers, which means that everyone keeps bonds with each other, as illustrated in Figure 4. Therefore, when they were interviewed regarding the knowledge-sharing relationships that were established, there was not a cheese maker isolated from the network. In this case, the network density was 7.31%.

The knowledge network stands out for its diversity of links between the cheese makers that join the three regions – ER01, ER02, ER09, ER20 and ER24. The role of ER09 is outstanding: he is located in the coastal region and he has become the central knowledge diffuser by maintaining a direct bond with 13 cheese makers. Most of these bonds are mainly used for transmitting information. Being a formal representative of an association of cheese makers that aims to promote the creation of a Collective Trademark reinforces this role.

Collaboration network

Collaboration implies reciprocity (mutual help). It is not an organised collaboration, but rather, it is spontaneous and emerges when the loan relationships occur, either of input (milk, rennet, salt, etc.) or the finished product (cheese), in order to cover unplanned demands.

Figure 5a shows that this collaboration occurs mainly between the cheese makers located in the same area (the proximity guarantees reciprocity) or between the cheese makers with the "compadrazgo" bonds, such as the actors of the sub-network formed by ER03, ER06, ER16, ER17, and ER27. Network density for collaboration is 6.9%.

As in the knowledge network, in the collaboration network, the role of ER09 is outstanding. His absence would result in the addition of three sub-networks to the three existing ones. The relevance of this actor is fundamental in the collective action perspective; the density of its links allows the connection of cheese makers from the coastal region, which in the friendship and "compadrazgo" networks are isolated from the whole network group.

Cooperation network

The implicit value in the cooperation networks is solidarity. This involves the joined operation of input (milk, rennet, salt, etc.), consolidated buying processes, and the cheese sale. Due to the demand of greater levels of trust, the linkage density between cheese makers decreases drastically and only occurs in the situations of the geographical proximity and involves no more than two actors, which is reflected in a 10% density (Figure 5b). In fact, the cheese makers express difficulties with engaging in joined operations due to the little trust that prevails amongst the majority. The same difficulty prevails when attempting to sell out in a collective manner. Due to the lack of knowledge of the way some cheese makers produce cheese, the prestige gained in the markets is put at a risk.

Association network

For some exponents of the LAS methodology (Boucher 2009; Boucher and Reyes-González 2011), the activation process, with a *know-how* rooted to the territory, begins with the collective actions of a structural character. This occurs, for example, with the creation of a formal association of cheese makers that have the support of a development promoter.

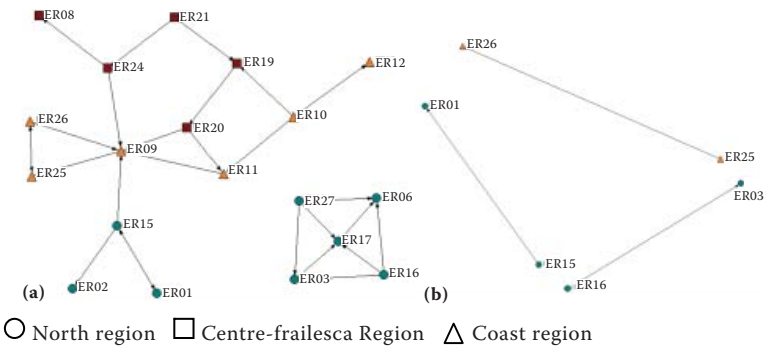

Figure 5. **(a)** Collaboration network. Size = 21 nodes; Density = 6.9% **(b)** Cooperation network. Size = 6 nodes. Density = 10%

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Under this conception, the activation process of the Chiapas Cream Cheese LAS has fulfilled this first phase to the extent that in 2009, the mercantile society "Processors Society of Chiapas Cheese S.P.R. of R.L" was created, with a total of 54 members. In the Rovere's scale (1999), this means that a high level of trust exists, to the extent that there are bases to share objectives and joined projects.

Although there is a common objective to obtain the legal protection as a collective trademark or denomination of origin (activation of the LAS), the resulting interaction patterns in the *collaboration* and *cooperation networks* state that the formal organisation tends to overestimate the informal links. The formal organisation includes structural and hierarchical criteria, and the informal organisation means personal bonds that establish the minimum level by which the reciprocity and solidarity can be ensured in time, with some regularity and certainty (Arellano-Gault 2010).

DISCUSSION

The valorisation process of the prevailing Chiapas Cream Cheese traditional *know-how* demands collective action from the group of cheese makers located in the territory, requiring enough social capital, such as trust, solidarity, reciprocity, and shared values. The network analysis suggests that social capital should be strongly determined by the relationships based on the geographical proximity and by the cheese maker's scale. Therefore, at a larger physical distance between the cheese makers (measured according to the lower existence of relationships among the cheese makers from one, two or three regions) and a larger scale (measured by the cheese maker status given the largest volume of processed milk), there are fewer probabilities to establish bonds of trust or relationships that are demanded for the cooperative actions (Figure 6).

The above is valid for the technical-economic (knowledge, collaboration, cooperation, association) and personal (friendship, kinship and "compadrazgo") interactions. Personal interactions only occur among the cheese makers of the same status and region. There is a close relationship between the personal (social) interaction patterns and those of the technical-economic character. This means that the personal interactions are the basis of the technical-economic ones. As Hoang et al. (2006) reported, the formal power relations and the traditional power hierarchies may suggest that being connected to the most important kinship networks in the community means being connected to the official power structure.

The result from the analysis of the three networks suggests that the degree of articulation prevails via the friendship linkages among 94% of the cheese makers that were interviewed and referred. On the other hand, different actors can play several roles. The diversity of roles may contribute to an increase in the options and opportunities for the small cheese makers (Spielman et al. 2011). This suggests the existence of a solid base to begin the process of the activation of the LAS.

Besides, there is a relationship between the interaction patterns by the family bonds and the degree of global acceptability of the cheese makers as a result of the trails with consumers reported by Villegas-de Gante et al. (2011). Cheese makers from the central and Northern regions had larger and more frequent contacts, so the rules of behaviour and the learning patterns of *know-how* were more homogeneous as compared to the coastal region cheese makers.

The importance of this homogeneity lies in the acceptability of the cheese; the acceptability can be better in cheeses from the first two regions than in cheeses from the coast. Actually, the interaction linkages by family bonds were only found in the Northern and central areas, and not on the coast. However, the previous results from Villegas-de Gante (2011) mentioned that the cheeses from the two first areas (Northern and central regions) were the most accepted because they were more moist, less friable, less acidic and had a lower level of the "barn smell." In contrast, cheeses from the coast were the least accepted due to greater friability, adhesiveness, acidity and ranch smell (Villegas-de Gante et al. 2011).

These findings suggest that the behaviour rules and learning patterns of the *know-how* have been more homogeneous in the central and Northern areas due to more frequent contacts registered between the cheese makers, as compared with the coastal area. Since the interest is the rescue and valorisation of the traditional *know-how*, the strong and frequent bonds among family and "compadres" have allowed the conservation of the *know-how,* as well as its transmission from generation to generation, for at least 50% of the cheese makers from the territory, achieving the production of cheeses with higher levels of consumer acceptability. Nevertheless, the risks of this type of networks should be avoided, since the members of

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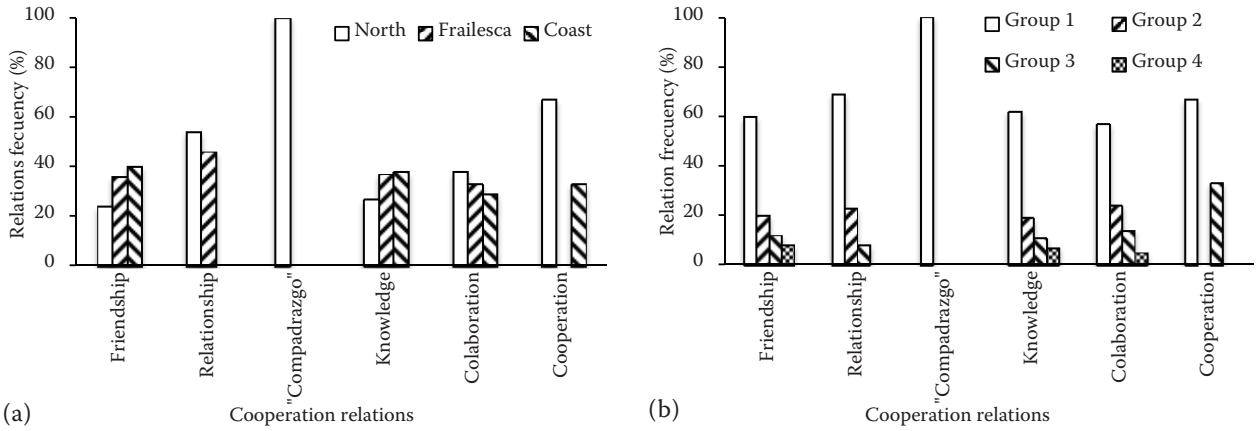

Figure 6. Relationship frequency of the cheese makers inside the networks (a) by study area and (b) by groups of producers

these networks tend to be reluctant toward the innovation that a differentiation and positioning process for a Collective Trademark demands.

However, in terms of innovation attitudes, some approaches of the social networks theory mention that the relevant relationships for innovation are characterised by their weakness. The reason for this apparent paradox is that the individuals and the organisations with close relationships among them tend to have the same opinion pattern about several subjects. Meanwhile, the actors with weaker bonds tend to move in more varied social circles, which allows them to have a wider access to information , therefore, a greater possibility to choose (Granovetter 1983; Koschatzky 2002).

It is more likely to learn ideas and new practices from brief contacts with several individuals and organisations as compared with frequent contacts with the same and closed circle of actors (Granovetter 1983; Koschatzky 2002). Therefore, to keep the cheese *know-how* tradition, the networks with a strong kinship and "compadrazgo" bonds are preferred, and these relationships were found in the Northern and central regions.

Given that any effort of a collective action involves the emergence of leaders that assume the role of directing efforts towards a common object, four actors stand out for their position in the network: ER02, ER09, ER16 and ER24. Three of them are located in the central and Northern regions, and only one was from the coastal region (Figure 2).

Under these conditions, actor ER02 has the biggest social capital to carry out as a catalyst of the network. The cheese makers recognise him as a prestigious actor, which reflects in his degree of entry, which happens to be smaller than ER09's. However, this actor does not recognise 63% of the small cheese makers as being similar to him (belonging to Group 1). He also expressed difficulties with sharing experiences with them due to the differences, especially in the production volumes.

Nevertheless, the cheese makers of Group 1 are the ones that produce the Cream Cheese with a greater attachment to tradition and they are the ones with the oldest tradition. In fact, they avoid using anything other than liquid milk, salt and rennet. They also respect the right time and movements necessary to curdle, settle, press and age the cheese in order to respond to the traditional standards. In contrast, some producers, such as actor ER02, allow themselves to modify the process in order to produce bigger quantities of the Cream Cheese for sale.

On the other hand, actor ER16 has a role as a central actor in the friendship and "compadrazgo" sub-networks. Although he is in the Group 1 (cheese makers with the smallest processed production volume), he is interested in relating with the relatives, friends and "compadres" that are in his environment.

ER02 and ER16 would be the structuring actors of the network, meanwhile ER09 and ER24 would be the diffusers given their tendency to bond with the major number of pairs. ER09 is the main driving force of the efforts that have been made to activate the LAS and achieve the Collective Trademark. As a formal leader of a legally constituted society, ER09 receives the first-hand information related to the process, as the link between the cheese makers and the organisations that are promoting the activation. ER24 is an actor that, even though he does not have a formal position, keeps bonds with the actors from

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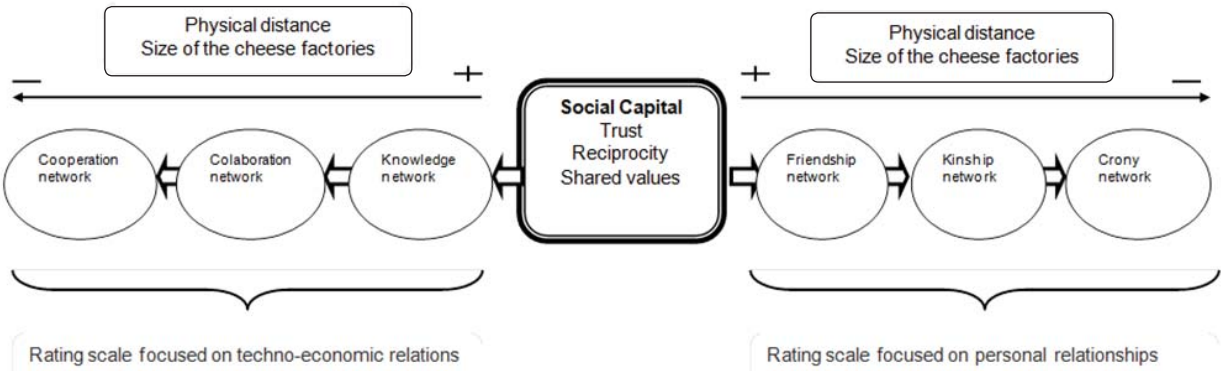

Figure 7. Social capital of the Chiapas Cream Cheese Processors Society social network

another area, and therefore is able to receive and distribute information. Although his production volume places him in Group 1 (smallest producers), he has specialised in selling the cheese in supermarkets, and therefore perceives the Collective Trademark as a *plus* to expanding the market.

The pre-existing friendship, kinship and "compadrazgo" relationships facilitate the knowledge, collaboration or cooperation relationships in a territory with a specific traditional *know-how*, and at the same time, all of them are strongly influenced by the physical distance among the actors, as well as the scale or size of them (Figure 7).

Regarding the existing activation level in the Chiapas Cream Cheese LAS, the evaluation considered the proposal of Correa-Gómez et al. (2006), Brun and Bridier (2011) and Boucher and Reyes-Gonzalez (2011). The LAS is in **level two,** given the supposed existence of an *organised group around common objectives,* thus obtaining a Collective Trademark. Their proposal mentions that the formal creation of an organisation is enough to begin a structural activation process. By the way, as in many organisations, the existence of a legally constituted organisation is not enough to share the objectives and boost major projects.

However, one must consider that the structural activation needs to transcend the formal creation of an organisation. It is important to value and mobilise the pre-existing social capital in the territory with a specific traditional *know-how* as a basis over which the activation process of the LAS is structured. That is relevant if the cheese makers want a successful and solid enough LAS to seize opportunities and overcome the possible threatening, but it is also relevant also in order to avoid inequalities or the exclusion of the small cheese makers (Hoang et al. 2006).

To affirm that the process begins when an organisation formalises is to overlook or minimise the informal pre-existing friendships, kinship and "compadrazgo" bonds that had been structured for a long time, which facilitate or hinder the knowledge, collaboration or cooperation bonds in the territory with a specific traditional *know-how*. It is necessary to consolidate the cooperation and association links, as these levels imply that all of the cheese makers share the mutual commitment needed to solve the problems and to establish relationships that would benefit them, as well as the activities that require an investment of time and effort.

It is also important to take into account the informal relationships, because they make the information exchange inside and outside the network possible. Informal relationships establish bonds that go beyond contracts and societies, as well as providers and clients. These relationships can result in the long and successful business relationships; but the innovation systems would work better when the interactive and inter-organisational learning is purposefully promoted through the collaborative projects (Kingsley and Malecki 2004; Ortiz et al. 2008).

The application of the social networks analysis allows for determining the strengths and weaknesses of a group or organisation. It allows for the study of the members' interaction and the evaluation of whether or not they are ready for the execution of a common major project, as well as to design a group strategy for increasing or strengthening the interaction of the group's members.

The use of the network analysis allows for locating those strongly-established relationships among the members of the organisation, as well as to identify the weakly incorporated frameworks. Therefore, an overview of the social situation of the organisation is offered by network analysis; the network can identify the key actors as the possible spokespersons to the rest of the members.

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The relationships of these key authors into the network offer an overview of the organisation and collectivism; they have information from different members and situations, they are the most suited to formulate the common problems in the group, and they are the most adequate to propose and spread solutions inside the network.

CONCLUSIONS

The analysis of the social networks within the Cheese Makers Society shows that there are relationships that make the flow of information possible, most of all, through the friendship linkages. The strong kinship and "compadrazgo" linkages have allowed the *know-how* to be passed on from generation to generation.

The apparent cohesion and confidence than reflects that the formal organisation exists only on paper. Among the cheese makers, deep asymmetries and differences prevail that can transcend individual choices to actively or passively participate in an activation process.

The geographical distance between the areas or production clusters, as well as the asymmetries among the cheese makers, hinders the creation of social capital in the Society. At a larger geographical distance and the production asymmetry, the social capital decreases and there is less probability of establishing interactions and, therefore, cooperative actions.

Although it is necessary to consider these risks, the network analysis is useful to identify the key actors for diffusion, as well as their links within the network and their relationship with the external agents. So, the network analysis allows one to value the integration level of the organisation for taking on important projects, for example, designing a unique label for the cheese makers.

The structural activation of the LAS must transcend the formal creation of an organisation and move toward the valorisation and then the mobilisation of the pre-existing social capital in a territory as a basis upon which an activation process is structured. It is necessary to consolidate the cooperation and association links, as these levels imply that all the cheese makers share a mutual commitment to solve problems and establish relationships that would benefit them, as well as the activities that require an investment of time and effort. However, the trademark procedure, and eventually, the Denomination of Origin, requires producers to be more active in consolidating their objectives.

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